THE HEATING AND VENTILATING MAGAZINE

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SCHOOL HOUSE HEATING AND VENTILATING

BY J. H. KINEALY

When considering a system of heating and ventilating for a school house it is well to consider the subject with regard to other requirements besides the two upon which great stress is usually laid. These two are that the system of heating shall be such that it will be able to maintain a temperature of 70 degrees in any kind of weather likely to prevail, and that the system of ventilation shall be such that at least 30 cubic feet of air per minute or 1,800 cubic feet of air per hour shall be supplied to each pupil. The mere heating of a building to a temperature of 70 degrees in any kind of weather, while an important consideration, is probably the easiest requirement to be fulfilled in connection with the heating, and the mere blowing into rooms of at least 1,800 cubic feet of air per hour per pupil is probably one of the easiest requirements to be fulfilled in a proper system of ventilating: it is easy to lay out a plant that will heat a building to 70 degrees, and it is easy to lay out a plant that will supply to a building at least 1,800 cubic feet of air per hour per pupil. The other requirements which a proper system of heating and ventilating for a school building should fulfil are not so easy to obtain.

When considering the requirements which should be fulfilled by the heating system of a school in order that the school may be said to be properly heated, due attention must be given to the conditions which prevail in every school room; and as these conditions are different from those which prevail in most other buildings it becomes more difficult to install a proper system of heating in a school building than in other buildings. It must be remembered that a school building is occupied almost wholly by young people, children, and that these children are obliged to obey the instructions of older people, the teachers in charge of the different rooms. The children are usually obliged to sit almost perfectly still in their seats and are supposed to concentrate their minds upon their studies or upon the recitations or lectures in progress at different times. The result is that the bodily comfort of the child, in order that he may work with profit to himself and that it may be easy for him to comply with the rules of discipline, must be carefully considered. No child can concentrate his mind upon his school work or can give little trouble as to discipline if he is subjected to bodily discomfort, if he is too cold or too hot. Especially is this true if the ch ld is exposed on one side to cold, such as would be produced by a draft from an open window, or to undue heat, such as would be produced by nearness to a large radiator. Furthermore, it is necessary that the temperature during the time that the child is in school should be as nearly as posible uniform. This should be not only in order that the child may have that bodily comfort that

is necessary for proper work and discipline in the school, but also to avoid injury to the child's health. A somewhat high temperature, a temperature of say 75 degrees, is probably less injurious to the child than a continually fluctuating temperature, one that is too high to-day and too low to-morrow. A child will soon learn to adapt himself and his clothing to any reasonable temperature, provided that temperature is uniform, but if the temperature is constantly fluctuating between extremes, either from hour to hour, or from day to day, the child is unable to adapt himself to any particular temperature because no particular temperature exists.

The requirements that a proper system of heating for a school building should fulfil are three in number and are as follows:

1st. The apparatus must be able to supply to each room the amount of heat made necessary by the demands of any outside temperature.

2d. The distribution of heat in each room must be such as to preserve a uniform temperature in all parts of the room when measured at a constant height above the floor.

3d. The supply of heat to each room should be automatically controlled so as to continually maintain a uniform temperature irrespective of the conditions outside of the building and without any attention or care on the part of the occupants of the room.

The temperature which should be maintained in a school room may be taken either as 68 or 70 degrees. Some school authorities think that 68 degrees is the proper temperature, and others maintain that 70 degrees is to be preferred. Where attention is not paid to the humidity of the air and where the air is as dry as it is in most school buildings which are ventilated, and where the temperature is measured about 5 feet above the floor, it is probable that 70 degrees is nearer right than 68; and hence the first requirement is that the apparatus should be capable of maintaining a temperature of 70 degrees in the rooms with any kind of outside weather likely to prevail. This, of course, raises the question as to how far the authorities of a school building are justified in spending money to put in a large heating apparatus. That is to say, it raises the question whether the authorities in erecting a school building are justified in putting in an apparatus large enough to maintain a temperature of 70 degrees in the rooms when it is, say, 15 degrees below outside, especially when it is known that an outside temperature of 15 degrees below is not likely to occur more than once in two or three years, and that when it does occur such a condition does not last more than a few hours. In other words, it raises the question whether or not the authorities are justified in putting in an apparatus for outside conditions that seldom occur, and whether they ought not to put in an apparatus that is large enough to heat the building to 70 degrees when the temperature outside is not lower than that which it is reasonable to suppose will ordinarily occur during the winter. It is probable that for most places in the United States a temperature of zero degrees seldom exists for any considerable period of time, and that hence an apparatus that is able to maintain a temperature of 70 degrees in all the rooms of a building when it is zero outside may be considered as fulfilling the first condition. It is, of course, true that there are places in the northern part of the United States where a temperature of 10 degrees below zero is quite common, and for these places there can be no doubt but that the heating apparatus for school buildings should be large enough to maintain a temperature of 70 degrees in the rooms when it is 10 degrees below outside. An apparatus that is too large becomes difficult to handle in warm weather, and it also makes the first cost unnecessarily large, as it means an expenditure of money upon radiating surface and piping which could be more profitably expended upon devices which would contribute to the better

working of the heating and ventilating system.

The second requirement, which is that the distribution of heat in each room must be such as to preserve a uniform temperature in all parts of the room when measured at a constant height above the floor, probably ranks in equal importance with the first. No part of the school room should be overheated and no part should be underheated. No seat should be more desirable or less desirable than the others, because such a condition would mean that some children would be exposed to conditions which would be unfavorable to their health and almost certainly unfavorable to that degree of bodily comfort which is necessary for them to properly do their school work. And further, a teacher in alloting the seats to the children in her room cannot favor one child at the expense of another, and hence it may happen, that a delicate child is exposed to a high temperature or a low temperature when the other children are fairly comfortable in their places. The parent of the delicate child who is exposed to an improper temperature will naturally object, and usually blame the teacher.

It is extremely difficult to have the temperature existing at all of the seats of a school room the same when some of them are put too close to the outside walls, for when a seat is much closer than two feet to an outside wall it becomes an extremely difficult matter to have the temperature at this seat always the same as that at the inside seats; and hence in interpreting this second requirement it must be understood that certain care must be exercised in placing the seats. It is, of course, impossible to have the same temperature on an outside wall or under a cold window that prevails on an inside wall or in the central part of the room. It is to be remembered in this connection that a thermometer in a school room indicates only the temperature of that part or place at which the thermometer is hung and that in almost all heated rooms the temperature at or near the floor is somewhat lower than the temperature 5 or 6 feet above the floor. In determining the distribution of the heat in a school room, temperature readings should be taken at the desks of the children at a height from the floor corresponding to about the chins or breasts of the children when seated at their desks. In a proper system of heating it will usually be found that where the distribution of heat is such as it ought to be when a temperature of 70 degrees is indicated by a thermometer hung about $4\frac{1}{2}$ or 5 feet above the floor and not on an outside wall, the temperature at a distance above the floor equal to about the height of the breasts of the children when seated will be in the neighborhood of 68 or 69 degrees, and will be the proper temperature for the children.

The question which is difficult to decide when considering this second requirement is: What shall be the maximum variation of the temperature at different parts of the room?

It will seldom happen that the temperature as measured at the different seats of a school room will be exactly the same, but will usually show a variation of at least 1 or 2 degrees. The less is the maximum variation allowed the more skill must be displayed in designing the apparatus and the more difficult will it be to install it so as to have no more than this variation. It is probable that a variation of 3 degrees may be considered as the maximum to be allowed in a well heated school building, and the more the variation exceeds 3 degrees the more does the distribution of heat depart from what it ought to be and the less desirable becomes the heating system. When the distribution of heat is bad the condition in the school room approaches that condition, with which we are all familiar, which existed in the old-fashioned schools heated by stoves. Here the pupils sitting near the stoves were obliged to shield their faces by holding their books between them and the stove, and the pupils at some distance were fairly comfortable, while the pupils at the far end of the room

away from the stove were chilly, and in many cases it became necessary for the pupils to gather round the stove to keep warm. This, of course, is an extreme condition, and is seldom if ever approached by a modern system of heating in a school house.

It must be understood that the variation spoken of here does not mean the variation from the normal, but the difference between the highest and lowest temperatures recorded at the seats of the pupils. Thus, if the average or normal temperature be 70 degrees and at one desk a temperature of 72 degrees be observed and at another desk a temperature of 68 degrees, the variation is not to be considered as 2 degrees, the difference between 68 and 70 degrees or 70 and 72 degrees, but it is to be considered as 4 degrees, the difference between 68 and 72 degrees.

The third requirement, which is that the supply of heat to each room should be automatically controlled so as to continually maintain a uniform temperature irrespective of the conditions outside of the building and without any attention or care on the part of the occupants of the room, has for its object almost the same end as the second requirement, which is that the children may not be exposed to a continually fluctuating temperature, sometimes high and sometimes low; and that whatever the temperature may be it shall be constant so that the children may come to adapt themselves and their clothing to that particular temperature. Many may object to requiring that the supply of heat should be "automatically" controlled, on the ground that this introduces the idea of a thermostat. The idea, however, is that the supply of the heat shall be properly controlled irrespective of care and attention on the part of the teacher or children. When the control of the supply of heat is left to the teacher the result usually is that there is a wide fluctuation of temperatures, if not from hour to hour at least from day to day. The teacher is usually occupied with her duties as a teacher and with the care and discipline of the room, and being busy she is not likely to notice a deviation from the standard or normal temperature unless that deviation is so great that she becomes uncomfortable. She is more likely to notice a temperature that is too high than one that is too low, because she is not obliged to remain quiet in her seat, and is usually moving more or less about the room. If the teacher fails to notice a deviation from the normal temperature which is supposed to be maintained in the room the children are likely to become uncomfortable in their seats, and to become restive and unable to properly attend to their work. There can be no doubt but that a proper degree of temperature has a very great influence upon the discipline of the school. When the children are too hot or too cold they become restive and uncomfortable, and are unable to properly apply their minds to the tasks assigned them. And if the teacher does not notice the variation of temperature, it is likely to be called to her attention by the restiveness of the children or by some of the children actually complaining. It is impossible for anyone outside of a room to control the supply of heat so as to preserve a uniform temperature in that room without making frequent visits to the room. And automatic control simply means substituting for a living being, one who is likely to be charged with other duties that will occupy the whole or at least a great part of his time or attention, a mechanical device that is never forgetful and never loses its vigilence, and that is charged with the one simple duty of controling the supply of heat.

In connection with this third requirement just as in connection with the second requirement the question arises, What shall be the maximum allowable fluctuation of temperature? That is to say, if the room is supposed to be kept at such a temperature that a thermometer hanging in a certain place is to register as nearly as possible 70 degrees, how much above or below 70 degrees may the thermometer rise or fall without the heating

system being condemned as not fulfilling this third requirement? Thermostats are put on the market under a guarantee to operate with a change of temperature not exceeding 2 degrees. That is, if the thermostat be set for 70 degrees it will operate to turn the heat off when the temperature rises to 71 degrees, and to turn the heat on when the temperature falls to 69 degrees, and thermostats often operate within a variation of even 1 degree. It is not reasonable to suppose, however, that the temperature of a room will change as quickly as a thermostat operates, and hence it is not fair to assume that the temperature of a room can be made to remain within as narrow a range of temperatures as that in which a thermostat or other automatic device can be made to operate. It, however, seems reasonable to suppose that the variation ought not to be greater than 4 degrees, and it is true that in many systems the variation will even be less than this.

The less is the maximum allowable variation the more skill and care must be exercised in designing and installing the heating system, and the more the variation exceeds 4 degrees the less perfect must the heating system be considered.

(To be continued)

HEATING AND VENTILATING IN EARLY DAYS

By E. P. Buffet

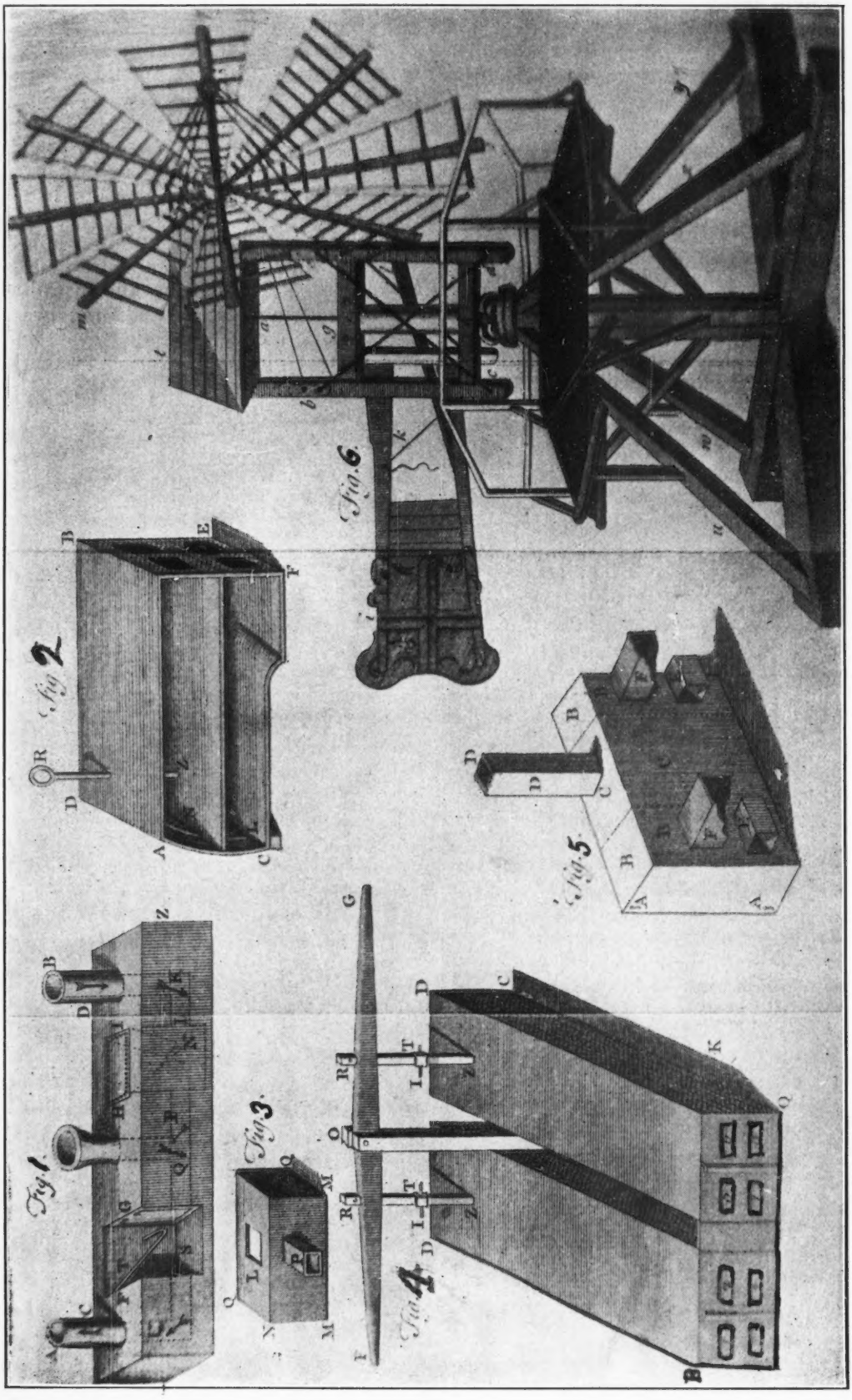
I—Ventilating Old Newgate*

We are so accustomed to the thought that our forefathers, up to comparatively modern times, lived in blissful ignorance of the principles of scientific sanitation, that it may be a little surprising to learn of a mechanical exhaust ventilating plant which was installed in a jail more than a century and a half ago. Realizing as we do the long persistence of the old notion that a prison should be something other than an abode of luxury, it is easier to imagine that the authorities went to the pains of pumping bad air into a penitentiary for the moral, if not the physical, improvement of its inmates, than that they actually exerted themselves to get some of the foul air out. But in the case of Newgate prison there were special reasons for this policy, as we shall see.

This famous old London institution dated back many centuries—perhaps to the reign of Henry I—and had at one time been used for the entertainment of disfavored nobles and high officials, as the Tower was later. It had been rebuilt after the great fire of 1666, and about the middle of the next century it was employed as the county jail of Middlesex, both for debtors and malefactors, and as a city prison. The building was of sumptuous architecture, with numerous Tuscan pilasters and entablatures, appropriately adorned with statues of *Liberty*, Justice, Mercy and Truth. These hospitable walls sheltered such a teeming population that the air became vile; jail distemper carried off many victims, and the stench of the place was an intolerable nuisance to dwellers in the vicinity. Worse yet, the contagion found its way into the court of justice which adjoined the prison, and jeopardized the health of honorable judges and counselors learned in the law. To this last circumstance we may perhaps ascribe that extraordinary enlightenment and solicitude for the welfare of jail-birds which led to the installation of the ventilating system about to be described.

The figures on the plate herewith reproduced are evidently not drawn to scale, but sufficiently indicate the main features of the apparatus. A windmill (Fig. 6) was placed on the roof of the prison, and operated a

*Information derived from the *Universal Magazine* of June, 1752, and April, 1764.



HEATING AND VENTILATING IN EARLY DAYS. I—VENTILATING OLD NEWGATE

set of several ventilators constructed according to the general principle of the two shown in Fig. 4. The interior arrangement of these appears in Fig. 2. A "midriff," or diaphragm, divides it into two compartments, being hinged at the right-hand end and moved up and down by the rod RZ, which in Fig. 4 is worked by the lever FG. These blowers were, in practice, 9x4½ feet. In spite of the proportions as depicted, the right-hand end of Fig. 2 is obviously intended to be the front end of one of the pair of blowers in Fig. 4. It will be noticed that in each of these ventilators are four valves; one upper and one lower opening inward to exhaust foul air from the building, and the others opening outward to discharge it. Fig. 3 illustrates the principle of a receiver into which the discharge valves open and from which the air is transmitted through the wall of the building by the trunk P. The more elaborate receiver installed in Newgate is shown in Fig. 5. It consists of three compartments. The outer ones, BB, receive the foul air through the trunks FF from the several wards. Thence the air passes through the ventilators and into the middle compartment C, whence it is discharged by conduit D. The ventilators were placed in an upper room of the prison and connected with the several wards by trunks with "sliding shutters," which controlled the ventilation of each independently. To prevent breaking the blower diaphragms by the formation of a vacuum in case all the wards were shut off at once, safety valves were arranged at EE (Fig. 5).

It will be necessary to explain that Fig. 1, which appears in the upper left-hand corner of the plate has nothing to do with the Newgate ventilators, but shows a device intended to be worn on the mouth to prevent suffocation when entering parts of mines, etc., pervaded by dangerous gases. It is essentially an arrangement of valves by means of which air is drawn in through the right-hand pipe, respired out and in at the middle orifice and exhaled from the instrument through the left-hand one. The suction pipe must evidently have connected with the open air if a reservoir of some sort were not carried into the mine.

Reverting to the windmill—which was erected by Mr. Cooper, of Pennyfields, Poplar, to drive the Newgate ventilators—we may attribute to a spirit of philanthropy on the part of its designers that they intended it "to move with a small degree of wind, that the ventilators may be the oftener worked." What the inmates did for fresh air when there was no wind at all is not stated. At any rate it is comforting to think that when the gales were blowing outside so as to penetrate every cranny and crevice of the building, the bellows were performing excellent service.

On the whole, the system failed to meet the gigantic requirements imposed on it. A few years later, in 1764, a movement was set on foot to rebuild the prison, and Parliament was petitioned by the city fathers for leave to do so. It was then that the obnoxious character of the place, before stated, was particularly recorded. Residents in the region of the jail alleged that the sessions house, "being contiguous to the said gaol, the health of all persons resorting thereunto must be endangered; and that the petitioners and the several other persons who reside near the said gaol are greatly annoyed by the noxious effluvia from the said gaol; and that the same is a most dangerous nuisance." Perhaps the tribulation of the neighbors resulted partly from the exhaust system, which dispersed the prison air. In default of positive knowledge how parliament treated the petition let us imagine that it took this view of the case, that the ventilating system was abolished, the prison walls hermetically sealed and that thereafter dwellers in the vicinage were permitted to inhale the breezes of the Thames uncontaminated.

(To be continued.)

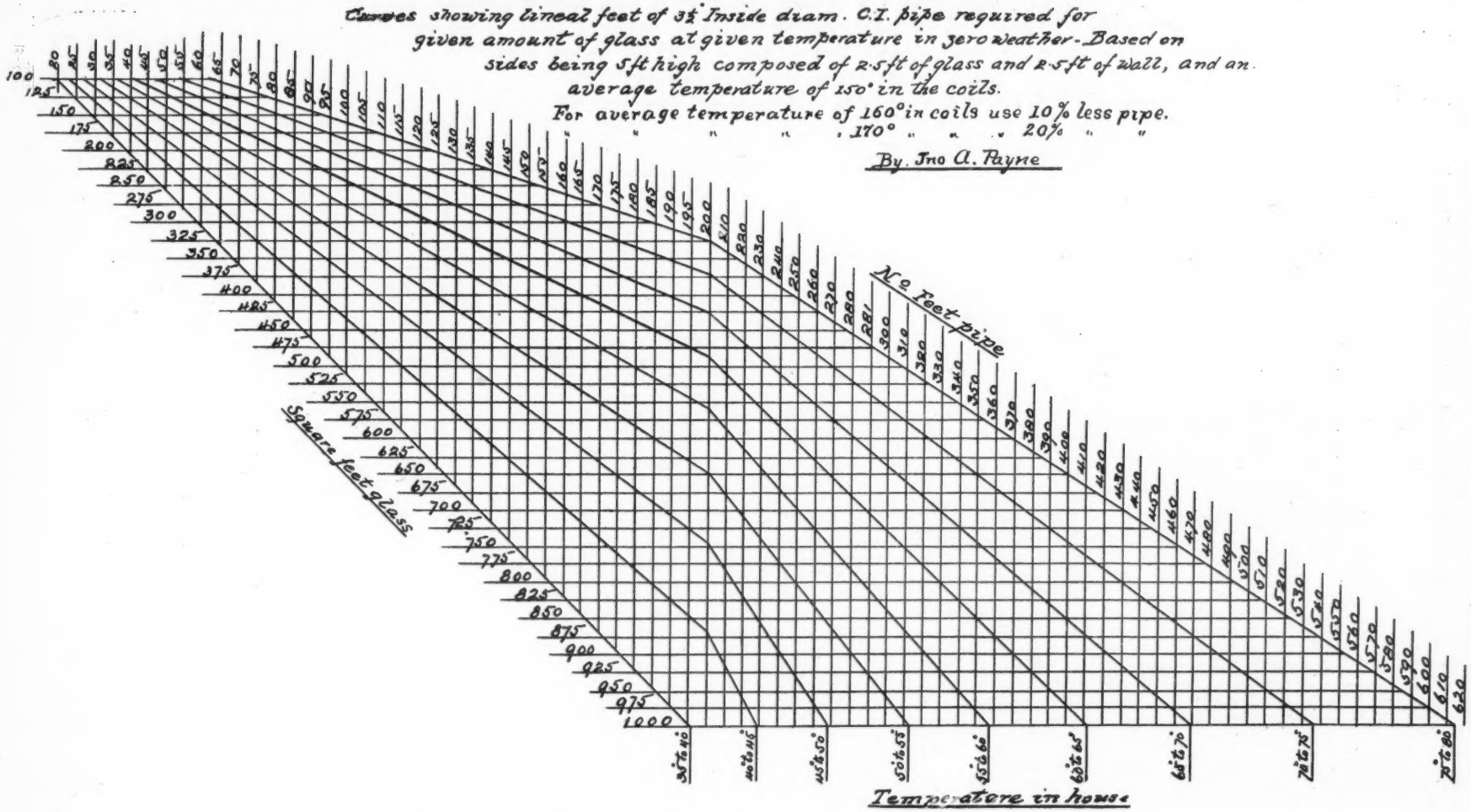
Table No. 1. 100 To 1000 Sq. Ft Glass.

Curves showing lineal feet of 3½" Inside diam. C.I. pipe required for given amount of glass at given temperature in zero weather. Based on sides being 5 ft high composed of 2.5 ft of glass and 2.5 ft of wall, and an average temperature of 150° in the coils.

For average temperature of 160° in coils use 10% less pipe.

" " " " 170° " " " 20% " "

By. Jno A. Payne



GREENHOUSE HEATING CHARTS

By John A. Payne

The charts herewith presented were made to meet the average conditions found in connection with greenhouse heating with the outside temperature at zero, and have been found reliable in actual practice. They are intended to be used for houses having an eave line up to about six to seven feet.

In the case of specially well built houses the amount of surface may be reduced about 7 per cent. Where the cubical contents of the greenhouse are large in comparison with the glass surface the amount of surface given in the charts may be correspondingly reduced. It is safe to say that for a house of 25 feet wide and 75 feet long, with the eaves 10 to 12 feet high, the surface specified in the charts may be reduced fully 10 per cent.

The amount of surface given in the charts is based upon the assumption that the water in the pipes will have an average temperature of 150 degrees. If this temperature is increased to 160 degrees the amount of surface may be decreased 10 per cent. If it is increased to 170 degrees, the surface may be decreased 20 per cent.

As before stated, the surface given in the charts is for a temperature of zero outside but it may be made to answer for other outside temperatures by the use of Table 6, as follows: Assuming that it is required to heat a house containing 600 feet of glass to between 35 and 40 degrees when the outside temperature is 10 degrees below zero, we see by Table 6 that this would be equal to heating the same house to between 40 and 45 degrees at zero.

On referring to Chart 1 we find that the line for a temperature of between 40 and 45 degrees in the house intersects the 600 square feet glass line at the point between the line indicating 135 and the line indicating 140 lineal feet of 3½ inch pipe; therefore, 130 feet of 3½ inch pipe, with the water at an average temperature of 150 degrees, will be sufficient to maintain 35 to 40 degrees in a house of this size when the outside temperature is 10 degrees below zero.

Of course, it is impossible to anticipate in a chart all imaginable conditions and it is necessary to exercise some judgment in the use of these charts and to make allowance for extra cold weather, specially exposed locations or other extraordinary conditions.

I believe, however that the charts as I have given them, embodying as they do the experience of years, will be found of value to engineers in estimating greenhouse heating jobs.

Other charts will follow in later numbers of the Magazine.

INDOOR HUMIDITY*

By Henry Mitchell Smith, M.D.

The demands of our variable winter climate, especially along the Atlantic Coast, have led to the development of devices for heating building by steam, hot water and hot air that are beyond criticism if considered from a standpoint of mechanical perfection and efficiency as heat producers.

A study of the conditions actually created by such seemingly perfect systems shows, however, that they are not entitled in their present form to an unqualified expression of approval. Viewed from a scientific or from a hygienic standpoint the average heating system of to-day is an anomaly productive of conditions that can be explained only upon the theory that the subject of artificial heating has not been broadly considered, and, therefore, certain fundamental and vital principles have been overlooked.

The principle upon which modern heating systems are based is erroneous in that the idea is simply to heat the air to a desired temperature, as indicated by the thermometer. Here is the great error. The air temperature alone is an insufficient index of our sensations of heat and cold. The human body in health maintains a constant temperature, irrespective of the temperature of its surroundings, and there is always a loss of body heat toward the atmosphere.

It would seem, therefore, that in heating buildings we had failed to appreciate the full importance of the fact that our sensations of temperature depend, not upon the heat that is received from outside sources, but

*Read in abstract before the Brooklyn Medical Society, May 15, 1903.

upon the rapidity with which the body heat is lost. Admitting this, we are at once confronted with the fact that loss of body heat is governed by other factors besides the temperature of the surrounding atmosphere, notably its relative humidity.

This is a factor that has been overlooked, and in this omission lies the anomaly of modern heating. So long as we continue to neglect the indoor relative humidity we shall continue to live in the unhygienic surroundings created by any method of heating that is not supplied with means for properly moistening the air. To do this should be as much the purpose of a scientifically constructed heating system as to furnish sufficient heat. All methods of heating that neglect to provide that important atmospheric element, watery vapor, are almost certain to bring about overheating or uncomfortable chilling. The so-called overheating of the average house is so common that it has come to be accepted as an inevitable accompaniment of indoor life. The key to this uncomfortable and unhygienic feature is the low relative humidity of the indoor atmosphere which is bound to exist unless provision is made for controlling it.

It is a fundamental principle in climatology that the relative humidity of any location is of the greatest importance, and yet in regulating the "climate" of our homes in winter this factor is entirely overlooked. It is startling to hear that the average heated room is as dry as a desert, that this dryness forces us to heat it to a most unhygienic degree, that it causes a waste of fuel and that diseases of the air passages are traceable to this source. Actual experiments show, however, that such statements are not exaggerated. References to the dryness of heated rooms have, as a rule, been so indefinite that they have failed to carry due weight and the importance of the subject has not been fully appreciated. Some of us have endeavored to fulfil the requirement by placing pans of water in the air-ducts of furnaces, but still the problem of sufficient moisture has remained unsolved. There are many reasons why water pans in the air-ducts will not give satisfactory and controllable conditions of humidity in the rooms, but it is not within the province of this paper to discuss that phase of the subject.

At the outset of this investigation it was necessary to know exactly the meaning of the phrase "overheated houses." In order to obtain data from which a starting point for improvement could be made records of the temperature in a large number of houses have been taken by the writer. It was found that it commonly ranged from 72° to 76°, and at times, in very cold weather, 78° F. was recorded.

Startling as these figures are in themselves and contrary to all accepted ideas of the proper conditions for living rooms, yet a puzzling fact was that the sensations of the occupants were frequently not in accord with the readings of the thermometer. Rooms felt chilly when the recorded temperature indicated that they were far too hot. It was often hard to believe that the temperature was above 68°, when it was actually 72° to 74°.

It was at once apparent that some unrecognized factor was responsible for this discrepancy between the temperature recorded by the thermometer and one's sensations. Moreover, it was found that the colder the weather the higher was the average temperature maintained indoors, an observation which any one may verify and which will show that rooms may feel warm at 70° to-day and decidedly chilly at 72° or 74° to-morrow.

This fact should arrest our attention at once; if there be no draughts in the rooms the outdoor temperature, however low, should not necessitate an indoor temperature higher than usual. If we assume that 68° or 70° is as warm as a room should be allowed to become, from the standpoint of health, and that such a temperature should be comfortably

warm for any healthy person, an outdoor temperature of 0° should not affect the indoor comfort at 70°. We shall find, however, that we usually do heat above 70° when the thermometer out of doors is below 20°. The reason for this is the insufficient amount of moisture in our rooms in proportion to the temperature (low relative humidity). The colder the weather the lower will be the indoor relative humidity, because of the greater difference between the outdoor and indoor temperature, as will be further explained.

During the winter of 1901 repeated records of the relative humidity taken in many different buildings accumulated a mass of figures which established the fact that 30 per cent. is the average in rooms heated as described.

This statement is in accord with the findings of other investigators. "The Proceedings of the Convention of Weather Bureau Officials," held at Omaha in 1898, contains a paper entitled "Atmospheric Moisture and Artificial Heating," by W. M. Wilson, of Milwaukee, who found that in buildings heated by steam and hot water, with an average temperature of 72°, the relative humidity was 28 per cent., while with furnace heating it was as low as 24 per cent.

Wilson refers to experiments made by Barnes, of Boston, who found the relative humidity at a temperature of 72° to be 31 per cent. He also refers to investigations of Mr. Henry in the Weather Bureau building at Washington during March, 1896, where it was found that at 72° the relative humidity was 31 per cent.

Now the United States Weather Bureau reports show that such a low average relative humidity naturally occurs only in the most arid regions. The reports contain tables of the mean monthly and yearly relative humidity observed at official stations throughout the United States and cover periods of from five to fourteen consecutive years. These tables show that from the total, 130 stations, in only 10 is the mean annual relative humidity as low as 50 per cent.

Denver, Colo., is a place one usually associates with the term "dry climate." There the mean annual relative humidity is 48.7 per cent.—nearly 20 per cent. higher than that of the winter atmosphere of our homes. The Weather Bureau maps, showing the normal annual relative humidity in the different sections of the United States discloses the startling fact that the area where the average is 45 per cent. comprises the section of country generally designated "the arid region of the Southwest," or "the Great Southwestern Desert."

We are principally interested, however, in the average outdoor relative humidity of New York city, where indoor records were taken, and I shall give only that of the months of October to April, inclusive: October, 73.9 per cent.; November, 74.8 per cent.; December, 73.6 per cent.; January, 75.2 per cent; February, 73.6 per cent.; March, 71.1 per cent.; April, 67.8 per cent. Comparison of these figures with 30 per cent. observed indoors shows at once the great contrast between the natural and the artificial conditions, and further elaboration of this point will reveal the fact that we are spending a great part of our lives in an environment the effect of which cannot but be detrimental. The comparison will also explain many of the discomforts experienced in artificially heated rooms.

Objections may be raised because the above figures of the outdoor humidity have been given without stating the accompanying air temperature, but omission of the temperature is this connection is allowable.

Within extreme limits, the effect upon the human organism is dependent upon the percentage of saturation of the aqueous vapor and not upon the amount of vapor present. Hann says in his "Handbook of Climatology:" "All organic substances are more or less hygroscopic, and this condition, so far as it depends upon the humidity of the air, is determined by the relative and not by the absolute humidity.

The point to be emphasized is that

every time we step out of our houses during the winter season we pass from an atmosphere with a relative humidity of about 30 per cent. into one with a relative humidity of, on an average, 70 per cent. Such a sharp and violent contrast must be productive of harm, particularly to the delicate mucous membranes of the upper air passages.

In seeking for the cause of the low indoor humidity we have to consider certain laws of physics and of meteorology.

In the first place, the idea is so prevalent that air in some mysterious way absorbs moisture that a protest should be entered against all expressions that tend to perpetuate this erroneous impression. Watery vapor, what we term moisture, is as much a part of the air as is oxygen; absolutely dry air does not exist in nature. It is with certain conditions of this vapor that we have to deal.

A vapor may be defined as an aeriform state of liquid. Every volatile liquid under favorable conditions changes to a vapor, which either becomes saturated or remains unsaturated, according to circumstances. These terms refer to the state of the vapor itself.

The higher the temperature, the more of a given vapor is required per unit of space before the vapor becomes saturated.

The weight of saturated vapors at different temperatures has been determined with accuracy. A cubic foot of saturated watery vapor at a temperature of 30° F. weighs 1.935 grains; at 70° F. it weighs 7.980 grains whether the cubic foot contains air or not. The presence of another gas only retards the diffusion of the vapor particles and does not affect the amount required for saturation, and all such expressions as "air saturated with watery vapor," "the capacity of the air for watery vapor," etc., are unscientific and should be avoided.

A vapor is said to be saturated when in a unit of space at a given temperature the maximum amount by weight exists and, the temperature remaining the same, no more vapor can form from the liquid with which the vapor is in contact. There will be no evaporation. If the temperature is reduced some of the vapor will be changed back to a liquid.

Now, if the temperature be raised the previously saturated vapor becomes an unsaturated vapor, because with increase of temperature more vapor is required for saturation. If the vapor is still in contact with the liquid from which it is was formed, vaporization, or evaporation, at once begins and continues until as much vapor again exists as can at this higher temperature. There is then more saturated vapor by weight in the same space than when the vapor was saturated at the lower temperature.

If, on the other hand, the temperature of the saturated vapor is raised, but the vapor be not in contact with the liquid from which it was formed, or if it is in contact with an insufficient amount of liquid the vapor will remain unsaturated and its degree of saturation is expressed by the percentage that its existing weight is of its weight were it saturated at the same temperature. Thus, at a given temperature, if the weight required for saturation is double that of the existing weight the vapor is said to be "50 per cent. saturated," and in speaking of such a condition in the atmosphere the correct expression is "the aqueous vapor in the atmosphere is 50 per cent. saturated," not "the atmosphere, or the air, is 50 per cent. saturated with aqueous vapor."

It is the tendency of all volatile liquids to form saturated vapors; this is spontaneous evaporation, and it follows that our sensations of "moist" and "dry" are wholly relative, depending upon the rapidity with which the tissues of the body, particularly the skin and mucous membranes, are called upon to give up water. This is governed by the percentage of saturation of the watery vapor in the atmosphere that surrounds us; not upon the amount of vapor that exists.

A given amount of watery vapor in the atmosphere to-day, at a cer-

tain temperature, may be nearly saturated and demand little moisture and the air feels damp because our bodies give up little water to the atmosphere. The same amount of vapor at a higher temperature will be farther from saturation and the air will then feel much dryer, because, although the same amount of vapor is present in each case, in the latter instance the lower percentage of saturation demands more moisture and causes the human body to give up more through the skin and the mucous membranes.

Let us suppose that at a temperature of 40° F. the weight per cubic foot of the existing watery vapor be 70 per cent. of that required for saturation. We express this atmospheric condition as a "relative humidity of 70 per cent." If now the temperature falls below 40° and the amount of vapor remains the same then the percentage of saturation will be higher than 70 per cent., since at a lower temperature less vapor is required for saturation. If the temperature continues to fall a point will be reached at which the existing vapor will be saturated; water will no longer be evaporated, the relative humidity has increased to 100 per cent. (saturation), with the same amount of moisture present that at 40° was enough to give a relative humidity of only 70 per cent.; on the other hand, if the temperature becomes higher than 40° the relative humidity will be less than 70 per cent., because more vapor is required for saturation at the higher temperature.

This latter conditon is exactly what occurs in every artificially heated room, unless an increased amount of watery vapor is produced by artificial means. Whatever be the percentage of saturation of the vapor that enters from out of doors a lower relative humidity is created because of the higher room temperature, and the human body is exposed to the enormous moisture-extracting properties of an atmosphere that is very dry—not because it contains less moisture, but because the existing vapor is so much further from the saturation point; for spontaneous evaporation is a constant phenomenon and is most rapid when the aqueous vapor surrounding it is furtherest from the saturation point.

The effect of different conditions of humidity is best shown by determining what the aqueous vapor lacks of saturation under different conditions, for this measures not only its capacity but its demand for moisture. There is a factor for this called the "saturation deficit," which many meteorologists have proposed to substitute for the relative humidity in the psychrometric tables.

The "saturation deficit" is the difference at any given temperature between the pressure, or tension, expressed in millimeters of the barometer, of the existing aqueous vapor and that of saturated aqueous vapor at the same temperature. The practical difficulty with the "saturation deficit" expressed in this way is that it means little or nothing to any one save the trained meteorologist.

Now, if we should interpret the saturation deficit to be the difference in grains per cubic foot between the weight of the existing watery vapor and the weight of saturated watery vapor at the same temperature—in other words, the lack of aqueous vapor per cubic foot of space—we shall have a factor which, I believe, will show more graphically than any other the bearing that different conditions of atmospheric humidity have upon the human organism.

Let us compare in grains per cubic foot the saturation deficit of the average winter outdoor conditions with that of the artificially heated room. The mean relative humidity of New York city for the months of October to April, inclusive, is approximately 73 per cent., as has been seen. The mean average temperature for the same months is 44°. The tables give the following values for the absolute humidity in grains, from which we obtain the saturation deficit as follows:

Average Outdoor Conditions Temperature.	Average rel. hum.	Average ab. hum.
44°	73%	2.404 (grs. per cu. ft.)
44°	100% (Saturation)	3.294 " " " "

Saturation Deficit=3.294—2.404=0.890 (grs. per cu. ft.)

Average Indoor Conditions. Temperature.	Average rel. hum.	Average ab. hum.
72°	30%	2.552 (grs. per cu. ft.)
72°	100% (Saturation)	8.508 " " " "

Saturation Deficit=8.508—2.552=5.956 (grs. per cu. ft.)

This shows that each cubic foot of aqueous vapor out of doors is 0.890 grains short of saturation, while each cubic foot of aqueous vapor indoors is 5.965 grains short of saturation—a direct measure of its capacity and demand for moisture.

The skin and the mucous membranes of the respiratory passages are the principal sufferers, since these tissues are always kept moist with their own secretions and from them water is freely abstracted to satisfy this large saturation deficit, such air passing with every inspiration over the moistening surfaces nature has provided in the mucous membranes calling for an enormous output of the fluid elements of these tissues. This leads to glandular over-activity and its consequent evils, the elaboration of which subject the scope of this paper does not permit.

The overheating of our houses has been accepted as a prominent cause of catarrh, but I am confident that the low relative humidity and consequently the large saturation deficit of the aqueous vapor in the atmosphere of our rooms in winter is much more important than is the overheating in itself, and it may be doubted whether the so-called damp climate of the sea coast or the shores of large inland lakes is in itself so responsible for the above diseases, as has been generally supposed. It seems much more likely that the great contrast between the indoor and the outdoor relative humidity in those regions is the real factor.

For, if we eliminate the class who lead a sedentary life and remember that the coast fishermen and sailors habitually live in an atmosphere in which the aqueous vapor is about 80 per cent. saturated, the question presents itself: "Are such persons more prone to catarrhal inflammation than are the inhabitants of a dryer climate, other factors in their lives being equal?" We know that all persons suffer more in winter from existing catarrh than they do in the summer, when even if their lives are sedentary the doors and windows of their homes and offices being opened the indoor and outdoor humidity are practically the same and they are living under conditions of higher humidity, both relative and absolute, or in a damper climate, so to speak, than in winter, when so much of the time is spent in the dry atmosphere indoors.

It is self-evident that at any given temperature the less the relative humidity is the larger is the saturation deficit, and this undoubtedly governs most closely the rapidity of evaporation and is a direct measure of the degree of damage that dry atmosphere causes to pictures, furniture, books, etc., for if there were sufficient moisture to maintain a smaller value for the saturation deficit these articles would withstand a temperature much higher than that ever attained in living rooms. The temperature in itself is not the destructive agent.

It may be of special interest to compare the saturation deficit in artificially heated rooms with the average at Denver, Colo., which is as follows:

Average temperature	Average relative humidity	Average ab. hum.
51°	50% (Approximately)	2.111 (grs. per. cu. ft.)
51°	100% (Saturation)	4.222 " " " "

Saturation Deficit=4.222—2.111=2.111 grains per cubic foot.

The previous computation showed that in artificially heated rooms this was 5.956 grains, or more than twice as large as the average at Denver, Colo., and nothing could express more graphically the dryness pro-

duced by artificial heating without artificial moistening. In addition to the excessive evaporation caused by such conditions the loss of body heat is greatly accelerated. If our rooms contained more moisture we could live more comfortably at a lower temperature. The overheating is required because of the lower relative humidity.

The atmosphere of our planet retains heat almost wholly by virtue of the aqueous vapor. Tyndall stated that "the removal for a single summer night of the aqueous vapor from the atmosphere which covers England would be attended by the destruction of every plant that a freezing temperature would kill."

The importance of aqueous vapor in the atmosphere is thus stated by Prof. Warren S. Johnston, who says: "It is a curious fact that it is only through the moisture in the air that it retains heat. Heat naturally radiates from all bodies that are warmer than their surroundings; if the air has little or no moisture in it the radiated heat goes right through it without warming it, but if it is moist it stops the radiated heat, and heat warms it. If it were not for the moisture in the air it would be too cold to live in. Humidity in the air is nature's great bed blanket for her children without which they would all perish; so, likewise, moisture in the living room acts as clothing and helps to keep us warm."

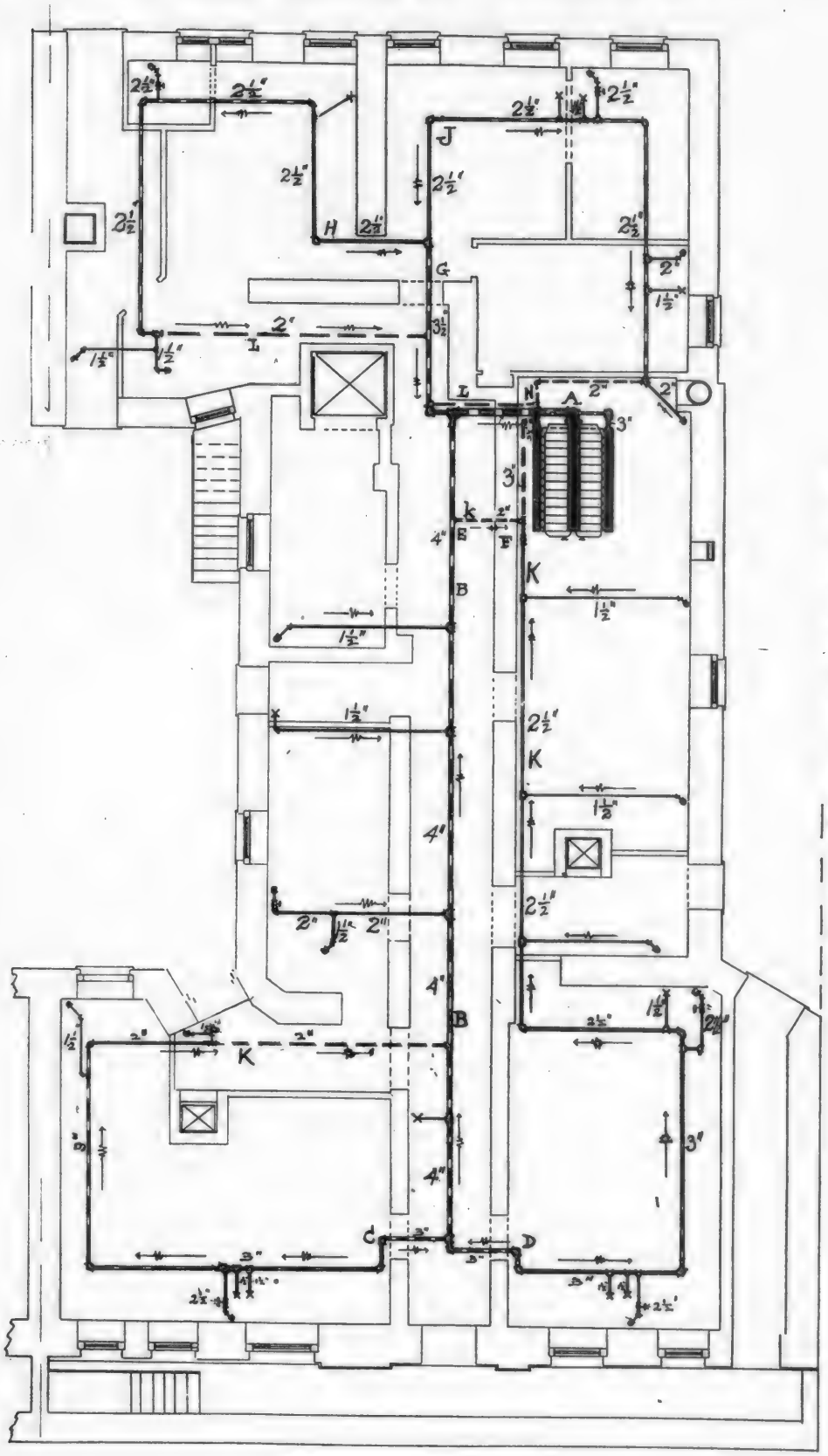
A moment's consideration, therefore, shows that the prevailing practice of depending upon the thermometer as the sole guide in the heating of buildings is not only inadequate and unscientific, but it is often misleading. It is not sufficient to know only the temperature if we desire either comfort or health, for the same temperature produces varying sensations of warmth or cold, depending upon the relative humidity at the time existing. It is unscientific and arbitrary to lay down a fixed temperature as a standard for living or sleeping rooms unless the relative humidity is indicated as well.

The same air temperature is not the same in its effects at different times, because the relative humidity varies, and unless more moisture is supplied to the air which we obtain from outside by various methods of ventilation the relative humidity indoors becomes unusually low in cold weather, because of the great difference between the indoor and outdoor temperature. Even though the relative humidity may be fairly high out of doors, the absolute humidity will be low, on account of the low temperature of the air.

Moreover, at New York and along the Atlantic coast the prevailing winds during cold periods are usually from the north or northwest, having passed over a dry, frozen area which has presented little opportunity for the air to take up moisture. At such times the temperature of the air indoors is allowed to become as high as 76 to 78 in order to feel comfortably warm. Records from steam heated apartments show that the relative humidity was sometimes as low as 25 per cent., with a temperature of 78, during a period of very cool weather in January, 1902. The high temperature is necessitated by the chilling of the body by the increased evaporation, evaporation being essentially a cooling process.

It is needless to say how unhygienic as well as uncomfortable is such a distortion of the proper relationship between temperature and relative humidity. By regulating the indoor relative humidity we could keep our room temperature much more nearly stationary, irrespective of the temperature outside. But no improvement in indoor atmospheric conditions can be expected until heating engineers and the people they serve realize that with the ever-varying absolute humidity out of doors no system of heating can be made satisfactory if the indoor relative humidity is disregarded. Even thermostatic temperature control will not fill the requirement, for a constant temperature is constant in its effects only if accompanied by a constant relative humidity.

(To be continued)



STEAM HEATING A NEW YORK APARTMENT HOUSE

STEAM HEATING A NEW YORK APARTMENT HOUSE

In heating buildings of moderate size conditions frequently occur necessitating methods that are slightly out of the ordinary.

In the case which we illustrate herewith, the first requirement was one of haste and the second was the arrangement of the piping in the basement so that it should not cross doorways or obstruct movement about the lower halls or the rooms in the basement.

That made it impossible to have the high point of the main at or close to the boiler and, in the second place, on account of the time that would be required to make openings through the walls, it seemed impossible to make either a single or double circuit system.

The first impression, therefore, in looking at the plan is, that an unnecessary quantity of pipe was used.

A six-inch pipe from the back of the heater "A" leads to the left; from it is taken off a four-inch main "B," extending 54 feet, to the front of the building, with a pitch toward the boiler.

The pitch of the mains is indicated by arrows showing the direction of flow of the water of condensation toward the boiler. From this it will be seen that at the front of the building the two high points are those indicated by the letters C and D, those at the rear by H and J.

The risers shown on the plan without valves are blind risers installed for the purpose of heating the rooms through which they pass. They are 2 inches in diameter and extend up through the ceiling of the sixth floor.

The risers marked with valves supply in every case a line of radiators on each of the five floors above the first. In most cases the radiators are 24-foot on each floor excepting the top floor which is commonly one or two sections larger in order to provide for the roof exposure.

Supply pipes for first floor radiators are indicated by an X, excepting that there is an 88-foot radiator in the hall which is taken off from the main close to the boiler.

There are no drips on the system excepting at the point "A." At this point the top drum of the boiler projects back farther than the back section of the boiler and into the bottom of it is connected a tee from which a 2-inch equalizing pipe is carried to each of the side drums at the bottom of the boiler; then there is a 3-inch drip and equalizing pipe connecting the main flow pipe with the return at that point, and taking care of all condensation from the steam mains B and G.

It will be understood that the return line "K," on reaching the main "B," turns and runs under B, being suspended directly below it, back to the point "E," where it turns (k) toward the boiler. In the same way the return pipe "L" apparently disappears for a time when it strikes the pipe "G." It is carried below "G" for a few feet and then turns to the right toward the boiler.

The return lines K and M drop to the floor at the point F, and the return L drops at N. Automatic air valves are placed at these low points, F and N.

As thus laid out, this system avoids crossing any of the doorways or interfering with head room in the passageways. It works perfectly, heating the building with no indicated pressure on the steam gauge and is in every way satisfactory. It was put in to take the place of a job which, while not yet completed, was obviously wrong and sure to prove unsatisfactory. There were 40 lines of supply risers and blind heating risers, all of which were 1½ inches in diameter. None of the radiator connections were larger than one inch and some were three-quarter inch. The pipes were badly trapped under the floors.

The engineer and superintendent of the work was George W. Clark, president of the Builders' Heating Company, New York.

THE HEATING AND VENTILATING MAGAZINE

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H. A. SMITH, EDITOR

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A NEW journal in the heating and ventilating field has been loudly called for for some time. The call seems to have been raised first in Europe, where the plumbing and heating contractors are at bitter war with each other, and the steamfitter hates to see anything about plumbing in his trade journal.

In this country, fortunately, the plumbing and heating fraternity dwell together in unity, and indeed most men who do steam and hot water heating are also plumbers.

The American Society of Heating and Ventilating Engineers has developed a movement which makes it safe to say that in few, if any, lines of effort is there a more aggressive and progressive spirit and more desire to get and impart information in regard to systems and methods. There has been, in consequence, a considerable improvement in the materials used and in the methods of installing them and there is room for much further improvement, so far as the trade at large is concerned.

The conditions in different buildings vary so widely that almost every job may be regarded as a problem by itself. The designer is constantly solving such problems and is always on the lookout for new ideas on the subject of his work. It will be the aim of this magazine to devote itself exclusively to heating and ventilating and to give the best thought of the best writers and the results of the work of the best men in the field.

THE enactment by the New York State Legislature of a law compelling certain ventilating requirements to be fulfilled in school buildings in the State largely increases the possibilities of business.

Every enterprising heating contractor should take advantage of this, not only by following up new work, but by using the new law as an argument in favor of overhauling and improving the apparatus in existing buildings.

The full text of the new law is given on another page of this paper. Something like it will probably be enacted in other States, but the fact of this official recognition of a heretofore vaguely understood necessity must tend to bring it more clearly to the comprehension of school boards in New York and every other State.

For years the so-called Massachusetts law has been used everywhere to show school boards what ought to be done, although it may be remarked that it was never a mandatory law, but simply permissive, and its effective operation was due to the wise application of it by the late Chief Wade, of the Massachusetts District Police.

The New York law goes further and can be made to exercise still greater influence.

OF this New York State law, it should be said that it is the result of years of work on the part of the American Society of Heating and Ventilating Engineers, and as finally

passed is a modification of a bill prepared by Senator Albert A. Wray, of New York, in consultation with a committee of the society. The Davis bill, as it stands, was skilfully modified by C. B. J. Snyder, architect and Superintendent of Buildings of the New York Board of Education, and was brought to the favorable consideration of the Assembly, Senate and Governor of the State by Hon. L. L. Davis, of Glens Falls, N. Y. To these three gentlemen it is obvious that much credit is due. There are others who have spent much time in the work, carefully considering the value of proposed bills, writing many letters to legislators in their favor and visiting the State capital in order to influence legislative opinion. Now that the work is done it should be profited by.

THE series of articles by Professor Kinealy started in this number will constitute a clear and forceful exposition of the principles which should guide school boards in caring for the young lives entrusted to them.

These articles, if laid at the right time before the proper authorities, will raise the standard of work, and benefit the trade everywhere as well as the public.

THE article on "Indoor Humidity," which Dr. Henry Mitchell Smith publishes in this paper is most timely, because of late much thought has been given to this problem. Heating engineers have found that under certain weather conditions and certain in-door conditions it is exceedingly difficult to make the occupants of rooms comfortably warm, or that a comfortable warmth is obtained only by excessive temperature as recorded by the thermometer, and that such excessive temperature produces headache and a feeling of lassitude.

The subject is one that should be followed up by engineers and remedies provided for existing defects.

DR. SMITH makes the extremely valuable suggestion that it would be well for every heated room to be provided with two thermometers; one to indicate the temperature, as is ordinarily done now, and the other to indicate what he calls the "sensible temperature." The first would be an ordinary thermometer, and the other should be what is known as the wet-bulb thermometer.

This is a suggestion that it would be well to consider carefully in connection with schools, as it seems to us that after a short time the proper temperature which should be indicated by the wet-bulb thermometer when the dry-bulb thermometer indicated 70° would soon be determined and then all that would be necessary would be to see that the two thermometers indicated the proper temperature. This would do away with any elaborate or scientific calculations in regard to humidity. In fact, the question of humidity would be considered only indirectly. The janitor or the teachers would regulate the supply of heat so that the temperature of the dry-bulb thermometer would be kept as nearly as possible at 70°, and the temperature indicated by the wet-bulb thermometer would be regulated by increasing or decreasing the supply of moisture to the room. There would be no hygrometer to be read and no calcula-

tions to be made. All that would be necessary would be to read two thermometers which every teacher and and every janitor knows how to do. The fact that one thermometer had a wet bulb would hardly be noticed by the ordinary teacher. We commend this suggestion to the attention of heating engineers.

SOME one in England has started again the perennial discussion about the relative merits of "natural" and positive ventilation. It will have little interest for readers on this side, where we use mechanical ventilation whenever the appropriation warrants the expenditure.

Doubtless there are excellent possibilities in designing what we call gravity ventilating systems and we have many engineers who are exceedingly expert at it, but they admit that when it comes to a question of absolutely furnishing a definite volume of air per hour some force must be provided besides the force of gravity or the difference in the weight between the inside and the outside air.

Therefore, while it is an excellent thing to have the skill requisite to produce something in the way of results by an arrangement of flues, and, in most cases, an aspirating coil or some device to create an artificial movement of the air, such means are not likely to be resorted to when the funds at the disposal of the builders will permit the purchase of mechanical appliances which insure a uniform discharge of air at all times in such parts of the building, or of each room, as the engineer may design.

It is possible that manufacturers of ventilating cowls may have thought themselves put in an unsatisfactory position by the paper of Mr. D. M. Nesbit, which started the controversy this time, but it seems hardly probable that their case has been benefited by their violent denunciation of the modern plenum system of supplying fresh cooled or heated air to rooms.

OF course, a good reason for this may be found in the fact that some engineers in this country and more perhaps in England do not feel qualified to design a fan system, and that when they undertake a fan installation they have to place themselves entirely in the hands of the fan manufacturers. This they not unnaturally object to. As one engineer said the other day: "If I were unable to figure a fan I would not lay out a fan system. I would lay out a system that I could myself design in all its parts."

It might be worth while for the fan manufacturers to consider whether the time has not arrived for a campaign of education so that expert engineers of fan systems might be more universally found.

House heating boiler men had to do some educating years ago, particularly hot water boiler men. They spent a lot of money on it and those who did not show up with a loss at the end of the year showed pretty small profits for several years. The result is that wherever there is a house to be heated there is somebody not far away qualified to lay out and install a satisfactory heating apparatus.

It would seem a not impossible condition that wherever a large fan installation is called for there should be several heating engineers at no remote distance able to meet the requirements.

SMOKING COMPARTMENT REFLECTIONS

So long a time has elapsed since I have smoked up that my pipe has well nigh lost its draft and my tobacco its flavor; however, smoking in a new compartment has its interesting features, particularly if the compartment contains a group of the old friends. Old friends and new, all have a bunch of gossip entertaining to listen to and the journey is greatly shortened by utilizing the possibilities of the smoking compartment.

A new reason for suicide seems to have been discovered—at least the only apparent cause for thinking that the self-shooting of the chief magistrate of one of our cities was intentional appears to be based upon the fact that he had shown considerable grief over the tendency of his constituents to retire from business as soon as they have accumulated $100,000. In other cities men have made away with themselves because their fellow townsmen after having accumulated $100,000 and even $1,000,000 keep right on trying to get all the rest of the negotiable securities in town to the exclusion of their less fortunate or less capable brethren.

It seems to me rather commendable for people to quit when they have enough, and give the others a show. Possibly $100,000 may be a low limit, but make it a little more; at all events let us not die because somebody else is disposed to leave part of the profits of business available for the rest of us.

Some folks continue to wonder why some other folks—never themselves, of course—will weaken a little on prices when there is more supply than demand. A few years ago we heard of nothing but manufacturers who were buried up with stock bills, payable for iron, etc., and who made concessions or even sacrifices in order to convert castings into negotiable paper or real coin. Of course, nobody is in exactly that shape just now, but there appear to be several manufacturers who are worrying over a dearth of orders and calling upon their salesmen to produce. This makes a little demoralization in the boiler and radiator market and there is an uplifting of hands at this "cutting." Of course, it is not really wise—quite the reverse—but it is human nature to forget sometimes that all the cutting in the world will not produce very much business when there is not much business going and to forget that prices once fixed on a low scale are likely to stay about there for the rest of the year and that every boiler or carload of radiators sold now at a low price means a loss of profit on many carloads when the fall rush comes on.

This union idea seems to be getting worse instead of better. I see they have organized in Chicago the "Hot Tamale and Crab Vender's Union No. 1." Wonder if John Allen belongs. Notice he has been distributing a lot of hot tamales lately; but maybe he prefers to run an open shop.

Englishmen make me laugh once in a while, even when they do not mean to be funny. Most of those that I have seen are all right, but once in a while one comes along who is what the boys call the limit.

Most of us know Nesbit, who used to be here so often that we called him "Nesbit of New York and London." We found that he knew his business and was, so to speak, the real goods.

I have been reading about another Englishman, of a different kind, who has been jumping on Nesbit for not

thinking that the same weather conditions prevail all the while, so that a "natural ventilating" job will work the same at all times. One of his cunning ways of showing up the fallacy of Nesbit's position is to cast reflections on the authorities he quoted. Some of these are pretty well known on this side of the water.

For example, he calls Alfred R. Wolff a "New York tradesman." That would certainly make a wooden horse laugh. I wonder what Wolff says about it. I am prepared to say that he laughs too. If there is a more rigid stickler for professional technicalities in any profession on either side of the globe, he should be sent as a special exhibit to the St. Louis exhibition. Tradesman! Well, I'll be blowed!

Then he sneers at the late Chief Wade, of Boston, as "a Chief of Police." That is a sample of ignorance that would not be so bad if the writer did not claim a pretty good knowledge of the profession. The Massachusetts District Police is rather a misnomer, and this man apparently thinks it is some kind of local constabulary and that Massachusetts is an outlying borough of Greater New York, or a prairie suburb of Chicago. It bears about the same relation to the Boston or any other police force as do the canals of Mars to the fortifications of Port Arthur. It should have been easy to guess that Mr. Nesbit was not quoting a peace officer as an authority on sanitary subjects.

All, or nearly all, English heating and ventilating firms with any claim to prominence have connected with them one or more men who have at least visited America and have some comprehension of what is being done on this side, and it is a little laughable to see parochial notions applied to a world-wide subject with a view to reflecting on a man of cosmopolitan experience.

Another droll thing about this is the earnestness with which these Englishmen go into a fight, particularly in print. The American commonly regards an attack of this kind as one of the things to be expected in the course of the day's work, and he does not accumulate many wrinkles or gray hairs worrying about it.

A good instance of this kind is the story of Fred W. Gardner—I hope I have got that middle initial correct, but it is several years since I haveseen Fred Gardner. Some publisher was trying to hold him up for some advertising, and conceived the happy thought of "writing him up," so he wrote a nice, long article reflecting on Gardner's past, present and future and a little of his ancestry. He got this set up in type and went around to show it to Gardner as something to appear in the next issue of the "Daily Roaster" and asked Gardner to proof-read it. Gardner went over it and made no changes, except to put in the W's, if that is the middle initial, and, handing it back, said: "Be sure to put in the W. I have not read what you said about me, and I don't care, but be sure to get the name right, Fred *W*. Gardner."

That, as I have said, is the American way, but when you cast any reflections on an Englishman's actions or motives or the way he does his back hair, and particularly if you print your aspersions in the paper, you are creating a riot that makes the anthracite coal strike look like a Sunday school picnic. Hence, the thick fog that hangs over the British Isles and makes ships run into each other.

I was in Utica the other day and noticed that Utica's celebrated tree had disappeared. It was not the only tree in Utica, but it was perhaps the most noticeable tree there or anywhere else. Its peculiarity was that it started where most trees stop.

On the principal business street and opposite the leading hotel is a church with two hexagonal towers rising to a height of about one story higher than the four-story business buildings around it. On top of one of these towers there flourished a tree. Having been there for years, it was a pret-

ty good sized tree, and cast its shade over the passers by.

Now the tree is gone, and the tower looks like any other church tower, and no longer is there a tree in the city that attracts the eye of the visitor. If there is in Utica a society for the prevention of cruelty to trees, they should start an investigation as to the motives of the woodman who did not spare that tree.

Wiltsie F. Wolfe has been living at Atlantic City this summer and only a few know why he does it. It has just transpired that he has been putting in his spare time practising on all the rifle ranges along the board walk. He always produces a pretty good string of bull's eyes at a convention and what he will do this month is likely to be a wonder.

Smoking is not allowed in the new building of the Pierce, Butler & Pierce Co., at Syracuse. Reason why? They had just got nicely moved in when they had a fire which turned them all upside down for a few days, and there is some controversy as to whose pipe caused it. Now it is a very safe place to go in and offer cigars—quite inexpensive, because the men all turn pale and look the other way.

One of my fellow passengers the other day was deploring the fact that in a new business connection he was without the railway passes he had been accustomed to. He said nothing came so hard to him as to pay railway fare. He must have been a lucky dog to have acquired the frame of mind where he expected free transportation indefinitely. Such luck does not always last, and when it ends it is well not to mourn over the present but to give thanks for free rides in the past and keep up good hope for the future. THE SMOKER.

The New Ventilating Law.

The following is the complete text of the bill introduced into the New York State Legislature by Hon. Loyal L. Davis, of Glens Falls, N. Y., passed by both houses and signed by the Governor, making it part of the law of the state:

STATE OF NEW YORK.

An Act to amend the consolidated school law, relative to proper sanitation, ventilation and protection from fire of school houses.

No school house shall hereafter be erected in any city of the third class or in any incorporated village or school district of this state, and no addition to a school building in any such place shall hereafter be erected, the cost of which shall exceed five hundred dollars, until the plans and specifications for the same shall have been submitted to the commissioner of education and his approval endorsed thereon. Such plans and specifications shall show in detail the ventilation, heating and lighting of such buildings. Such commissioner of education shall not approve any plans for the erection of any school building or addition thereto unless the same shall provide at least fifteen square feet of floor space and two hundred cubic feet of air space for each pupil to be accommodated in each study or recitation room therein, and no such plans shall be approved by him unless provision is made therein for assuring at least thirty cubic feet of pure air every minute per pupil, and the facilities for exhausting the foul or vitiated air therein shall be positive and independent of atmospheric changes. No tax voted by a district meeting or other competent authority in any such city, village or school district, exceeding the sum of five hundred dollars, shall be levied by the trustees until the commissioner of education shall certify that the plans and specifications for the same comply with the provisions of this act. All school houses for which plans and detailed statements shall be filed and approved, as required by this act, shall have all halls, doors, stairways, seats, passage ways and aisles and all lighting and heating appliances and apparatus arranged to facilitate egress in cases of fire or accident and to afford the requisite and proper accommodations for public protection in such cases. All exit doors shall open outwardly, and shall, if double doors be used, fasten with movable bolts operated simultaneously by one handle from the inner face of the door. No staircase shall be constructed with wider steps in lieu of a platform but shall be constructed with straight runs, changes in directions being made by platforms. No doors shall open immediately upon a flight of stairs, but a landing at least the width of the door shall be provided between such stairs and such doorway.

2. This act shall take effect immediately.

Ventilation of the House of Commons, London.

In spite of the many attempts made to improve the ventilation of the Houses of Parliament, it is undoubtedly a fact that members have experienced very depressing effects therein, and it has now been decided to thoroughly overhaul the arrangements, and to install new ventilating plant.

Messrs. Matthews & Yates, Ltd., of Swinton, Manchester, also of London, Leeds, Glasgow, etc., have been entrusted with the order for this plant.

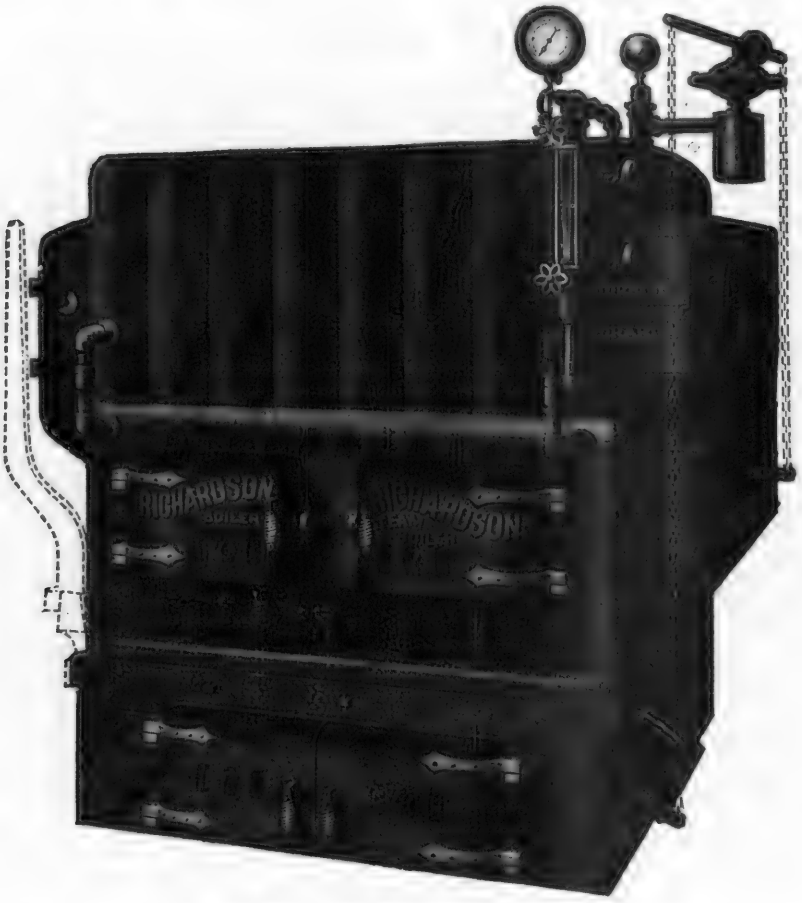
Experiments already made give the assurance that such an improvement will be effected throughout, that members will have no further cause for complaint.

During the past two years or so, Messrs. Matthews & Yates have supplied some 60 or 70 fans for the ventilation of committee roofs, division lobbies, lavatories, etc., and it is doubtless due to the satisfactory working of these fans, and the results obtained therefrom, that they have now been entrusted with the larger work of ventilating the debating chamber itself.

NEW DEVICES

Richardson Boilers.

The Richardson steam and hot water house-heating boilers illustrated herewith are designed to embody practically all of the good features claimed for other boilers beside advantages peculiar to themselves.



RICHARDSON BOILERS. FIG. 1

The first point in this unique construction upon which the manufacturers lay special stress is the fact that it has 92 per cent. of direct fire surface, and direct surface is commonly considered equal to at least four times the same extent of flue surface.

The water is divided into thin sheets directly over the fire, and being exposed to the direct rays of intense heat from the burning coal absorbs, the manufacturers claim, more of the heat units from each pound of coal consumed than any other boiler ever constructed.

All of the fire surfaces are self-cleaning, and yet every inch is readily accessible.

These boilers, as shown in the illustration, are made up with cast iron sections each having a water leg at the back of the boiler, the upper portion of the section projecting forward over the fire. The sections are connected at top and bottom by heavy cast iron turned nipples, making an iron to iron connection, and the sections are held together by four rods passing entirely through the boiler, through cored openings so that they do not come in contact with the water or steam.

The steam dome is 0½ inches high, and the water line is at the bottom of the steam dome and not in the tubes. This large steam dome together with the large water leg insures a steady water line.

The clean-out doors are lined with asbestos, and fitted with perforated iron plates four inches away from the door, thus retaining the heat in the boiler.

The end boxes are interchangeable so that the smoke exit can be at either end of the boiler. There is a direct draft damper to aid the quick starting of the fire. The boilers have large, heavily cor-

RICHARDSON BOILERS. FIG. 2

The course of the draft is upward among and through the overhanging sections until the extreme left end of the boiler is reached when they pass to the rear and then to the right through the large openings in the sections, as shown in Fig. 2, to the smoke outlet at the right-hand end of the boiler.

The boiler can be completely drained, and yet its construction closely approximates in other respects the rapid action of the drop tube boilers.

The smoke exit is provided with a sliding damper giving complete control over the combustion.

An excellent point is the very large water leg, 7 by 7 inches.

rugated, independent water fronts with large connections at top and bottom at each end. These can be disconnected from the rest of the boiler and used for hot water supply.

The grate bars are very heavy and of a design that has been found perfect. All bars can be readily removed and replaced. All of the working arrangements of these bars are on the outside and are very simple and accessible.

The ash pit is very large and heavy and 17½ inches high.

The flues are large enough for the use of soft coal if desired.

The arrangement of the boiler for firing from what might be called the side of the

grate is a great aid in the proper care of the fire. No part of the grate is so far from the fire door that it cannot be readily cleaned and kept properly covered with coal.

The boiler is said to have features that all the trade realize boilers need, yet before have never been adopted. Ninety-two per cent. of direct fire surface and also the long fire travel will produce more heat to each pound of coal—that is what a customer buys a boiler for—to heat with economy of fuel. They are the only boilers made claiming such a percentage of direct fire surface.

These boilers are an addition to the smaller sized line manufactured by the Richardson & Boynton Co., 232-6 Water street, New York.

This form of assembling also does away with the necessity for special tools; a monkey wrench is all that is required.

In appearance the "Novus" is very artistic and the formation of the sections (tubes being vertical and not crowded) gives excellent results.

This radiator is made in four sizes, all 12 inches wide, as follows:

36 inches high, 9½ feet surface.
28 inches high, 7½ feet surface.
20 inches high, 6 feet surface.
14½ inches high, 4½ feet surface.

Including lugs the height in each case 2 inches more.

When intended for steam and specially so ordered, the "Novus" will be furnished connected at the bottom only.

More complete data, showing various forms of assembling, style of brackets, etc., will shortly be ready for distribution.

"NOVUS" WALL RADIATOR

"Novus" Wall Radiator

The National Radiator Co., Johnstown, Pa., present to the heating trade their new wall radiator, the "Novus," herewith illustrated. The manufacturers call special attention to the form of construction which they have adopted, namely, the slip nipple by which, owing to its elasticity, the expansion and contraction due to the heating and cooling of the radiator are completely taken up. A practical test during the past winter has demonstrated that the "Novus" is absolutely proof against leaks under the most severe tests of heating and cooling to which a radiator over 25 feet long could be subjected.

Golf Tournament

In accordance with call issued some weeks ago by Secretary Walter S. Appleton, the Eastern Trade Golf Association held their early summer tournament on the links of the Nassau Country Club, Glen Cove, L. I., on June 7, and brought out the enthusiasts of the heating and plumbing manufacturing trade.

The day was most unpropitious, as the overhanging clouds threatened rain at almost any moment. Fortunately it was a threat with little fulfillment, and the umbrellas and rain coats with which members

had provided themselves were not brought into use.

Twenty-one players started in the programme arranged by Captain Barrett, who had thirteen cups at his disposal, and these were won as follows:

First Class:

Club challenge cup, won by F. H. Simmons in 86.

Smith & Thayer cup, won by P. R. Jennings in 92.

Dimock and Fink cup, won by F. B. Barrett, in 93.

Second Class:

"Engineering Review" cup, won by E. C. Molby, in 85.

Runner up, club cup, F. C. McLain in 106.

FRANK H. SIMMONS
EASTERN TRADE GOLF ASSOCIATION

Third Class:

"Plumbers' Trade Journal" cup, won by J. R. McMann in 128.

For the runner-up cup A. A. Ainsworth and M. D. Fink tied at 130, and Mr. Fink won the toss.

Fourth Class:

"Heating and Ventilating Magazine" cup, won by J. S. Simmons in 128.

Runner up, George W. Bridgeman, 141.

Consolation Class:

"Metal Worker" cup, won by F. K. Chew in 158.

Ransom cup won by W. S. Appleton in 191.

President's cup, best 36 holes, won by F. H. Simmons in 175.

Club handicap cup, won by F. B. Barrett in 81 net.

The Nassau course is perhaps the best in the United States and is located close to the north shore of Long Island, a few miles from President Roosevelt's home at Oyster Bay. The surroundings are beautiful and the club house large and handsome. An excellent lunch was served at the noon hour and the day was most enjoyable in every respect.

The so-called Ransom cup is a "duffer's" prize made by Stephen Ransom last year. It consists primarily of a piece of four-inch pipe with a cap for a bottom, and handles made of half-inch pipe and fittings. It was presented to the winner by being thrown from the balcony of the club house to the lawn where he stood. A dozen or two caddies pounced upon it and when they realized that it was a duffer's cup they executed hand-springs and cartwheels and stood on their heads, and otherwise expressed their delight at the novelty.

Frank H. Simmons being the present holder of the Club Challenge Cup, got a "second leg" on it, and will have to be beaten at the next tournament or the handsome piece will become his property.

At present he is also rejoicing in the possession of the Russell "East and West" challenge trophy.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Summer Meeting

The seventh semi-annual meeting of the Heating and Ventilating Engineers will be held at the Hotel Cadillac, Detroit, Mich., July 15 and 16, with sessions at 10 A. M. and 2 P. M. on the fifteenth and at 9.30 A. M. on the sixteenth.

Secretary Mackay says that the Hotel Cadillac has made a special rate of $3.00 per day and upward on the American plan, and $2.00 per day and upward on the European plan to members and others attending the meeting.

Last summer's meeting at Niagara Falls was exceptionally pleasant and interesting, but it is expected that the Detroit meeting will surpass it. Every member of the society in the West should make a special point of being present and of bringing as many as possible who are interested in the subject of heating and ventilating and, therefore, likely to become members.

It would greatly add to the pleasure of the trip if eastern members would rendezvous at Buffalo and all go to Detroit by steamer. It is a most comfortable and pleasant trip.

The Detroit and Buffalo Steamboat Co. have two magnificent large steamers, the Eastern States and the Western States, one or the other of which leaves Buffalo every evening at 5.30, arriving at Detroit

at 7.30 A. M. The company have kindly made a special rate of $3.50 for the round trip for members and guests of the Society attending this meeting. State rooms and meals are, of course, extra. This gives a day at Buffalo for those from the East, and can be used for visiting Niagara Falls or transacting business in Buffalo, having the evening on the water, which is always delightful.

Secretary Mackay has lately sent out a membership ballot containing the ominous number of thirteen names. As all of the candidates have been passed by the board of governors there is probably no occasion for a superstitious candidate to feel alarmed.

W. M. MACKAY
SECRETARY, A. S. H. & V. ENGINEERS

H. B. GOMBERS
SECRETARY, M. S. & H. W. FITTERS

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

National Convention

The National Association of Master Steam and Hot Water Fitters will hold their annual convention at the St. Charles Hotel, Atlantic City, N. J., June 13 to 16.

Secretary Gombers has arranged for a special rate at the hotel, and as usual railway certificates can be obtained entitling members and visitors to a reduced rate for transportation.

While it is probable that some who have promised to be present may default the indications are that the attendance will be larger than usual.

Monday will be devoted to a meeting of the Committee on Trade Relations and such members as have any complaints to lay before that committee.

It may be stated that the Association has never been in better condition, its relations with the trade being all that could be desired.

On Monday evening the Master Steamfitters of Philadelphia will give an informal dinner at the Hotel Raleigh to the national officers and members of the Philadelphia trade.

The convention proper will open on Tuesday and will probably complete its work on Wednesday.

Thursday is to be devoted to an outing. The New York City Association have arranged for a steamboat ride and shore dinner.

New York State Convention

The New York State Association of Master Steam and Hot Water Fitters held their tenth annual convention at Rochester, May 10 and elected the following officers: President, William H. Gaylord, Binghamton; vice-president, Frank H. Falls, Rochester; secretary and treasurer, Frank Dobson, New York; sergeant-at-arms, William Milligan, Rochester. The Board of Directors will consist of these officers and E. Rutzler, New York; J. Henry Howe, Rochester; Edward Joy, Syracuse; John A. Creelman, Rochester; and Charles Geiger, Buffalo. Henry B. Gombers, of New York, was appointed recording secretary.

TRADE AND MISCELLANEOUS NOTES

Clarke Merchant, president of Merchant & Co., Philadelphia, Pa., died May 7 of pneumonia at the age of 67.

Mr. Merchant was formerly in the navy; he served through the civil war, resigning in 1865. He then located in Philadelphia and soon started the present large business of his company in tin plate and other metals.

Spencer A. Jennings, of Bruce & Cook Co., New York, died May 12 at Glen Cove, L. I. Mr. Jennings was senior member of the firm, to which he was admitted in 1882 when it was 70 years old.

Horace W. Leighton, of Leighton, Davenport & Co., Bangor, Me., died suddenly May 15 at Bar Harbor, Me.

Lawson Plumbing & Heating Co., Homestead, Pa., has been incorporated by O. P. Lawson, Wm. L. Davis, and M. S. Hillman, with a capital of $15,000.

Lutz & Haas have opened a plumbing establishment at 600 Race street, Harrisburg, Pa.

Miami Valley Plumbing & Heating Co., Piqua, O., has been incorporated by John A. Heiser, M. L. Heiser, M. A. McKole, and L. Heiser, with a capital of $1,000.

Geo. W. Schmitt Heating & Ventilating Co., Oakland, Cal., has been incorporated by Geo. W. Schmitt, Teresa E. Schmitt, Chas. F. Sinclair, and H. B. Smith, with a capital of $10,000.

Bicalbey Fan Co., Buffalo, N. Y., has been incorporated by Theo. P. Noble, Wm. H. Finnegan, and C. H. Bicalbey, with a capital of $20,000.

Peerless Heater & Valve Co., Detroit, Mich., have bought out the Union Brass & Iron Works of that city.

O. A. Flint & Co. have started a heating business at 125 Oxford street, Lynn, Mass.

THE ÆOLIPYLE

When applied to the Smoke Collar of a Furnace

SAVES Time, Labor, Coal.

PREVENTS Escape of Coal Gas.

GIVES Additional Heat and an even Temperature night and day.

Recommended by Furnace men. Specified by Architects. Adopted by the United States Government.

In use by thousands of individuals, as well as Railroads and School Boards.

Send for illustrated Booklet and Trade Discounts.

ÆOLIPYLE CO., 237 Water St., NEW YORK.

George I. Irlbacker, a leading heating and plumbing contractor of Buffalo, N. Y., has been declared bankrupt. His assets are estimated at $20,000 and liabilities about $60,000.

C. A. Hjarpe has opened a plumbing shop at 127 Church street, New Britain, Conn.

Rufus Dalton, Upland Pa., will shortly open a plumbing establishment at Chester, Pa.

Sullivan & Carmody have opened their new plumbing shop at 173 High street, Holyoke, Mass.

Wallace Bros. expect to open a plumbing establishment on Union street, Dorranceton, Pa.

William Goudge has opened a plumbing shop on Seventh street, Ashland, Pa.

Ehret & Obst Plumbing Co., Bellville, Ill., has been incorporated with a capital of $2,000.

W. J. Dowsett, Marshall, Mich., has bought the plumbing establishment of W. H. Porter, of Jackson. He will continue his business at Marshall also.

Campbell, Quinn & Quirk, 27 Park Street, Bangor, Me., are a new firm in the heating and plumbing business.

Cochrane Plumbing & Heating Co., Des Moines, Iowa, has been incorporated with a capital of $10,000. The officers are Wm. A. Cochrane, president; C. C. Crowell, vice-president; and F. H. Reynolds, secretary.

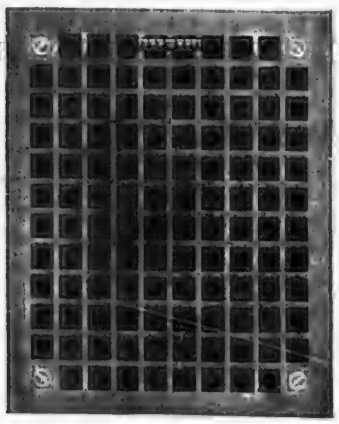
Human Instantaneous Water Heater Co., of Jersey City, N. J., has been incorporated with a capital of $50,000. The incorporators are A. A. Kelly, S. H. Human, Theodore Linke and James T. Power.

Chicago Heat Regulator Co. has been incorporated with a capital of $5,000 by E. M. Marshall, F. E. Ayers and R. S. Scherling.

Standard Temperature Regulating Co., Newark, N. J., has been incorporated with a capital of $100,000 by James T. Reid, James C. Hutchinson and John L. Reid.

Phelps Brothers, the New York manufacturer's agents for the sale of boilers, radiators, valves, pipe covering, etc., have established themselves at 210 Water street.

New York & Hoboken Steamfitting Co., 74 Harrison Street, Hoboken, N. J., have opened a branch at 457 Canal street, New York.



Kernan Registers

ALL SIZES AND FINISHES
WE CAN SAVE YOU MONEY

Syracuse Stove Works,
SYRACUSE, N. Y.

Telephone, 383 John.

NEW YORK BRANCH,
231 Water St.

CLASS A. RETURN TRAP.

The Albany Return Steam Traps

have been the **STANDARD** for over **THIRTY-TWO YEARS.** For returning water under pressure to the boiler, they will perform this duty fully as well, and in many cases better than the so-called steam loop.

Send for circulars A, B, C and D.

MANUFACTURED BY
ALBANY STEAM TRAP CO., ALBANY, N.Y.

FREDERICK TOWNSEND
PRESIDENT

JAMES H. BLESSING
GEN. MGR.

George P. McCullom has purchased the stock of the Taylor Plumbing & Heating Company, Muskegon, Mich.

Joseph Westover has started in the heating business at 701 Market street, Kingston, Pa.

The York Engineering Company, York, Pa., has been incorporated, with a capital of $25,000, by president, H. H. Lindemuth; treasurer, Ellis S. Lewis, and secretary, William H. Myers.

McAllister & Champion are a new heating firm at 90 Gorton avenue, Cortland, N. Y.

King Plumbing Co. has been incorporated at Keokuk, Iowa, with a capital stock of $10,000, for the purpose of conducting a plumbing, heating and gas fitting business.

Ames Plumbing & Heating Co., Ames, Ia., is a new concern.

Simpson Heater Co., Newark, O., will erect a new foundry.

Rutland Heating Co., Rutland, Vt., has been incorporated by S. M. Wilson and W. R. Kinsman with a capitalization of $100,000.

The Fentzlaff Heating Company has been incorporated at Montclair, N. J., with a capital of $15,000 by Albert Fentzlaff, Theodore H. Johnson and Robert E. Moss.

Sun Heater Co., Jersey City, N. J., has been incorporated by Wm. C. Tranz, John J. Phelan, Augustus C. Einbeck, with a capital of $100,000.

Textorius Mfg. Co., Boonton, N. J., has been organized for the manufacture and sale of compressed air machinery. The president is K. O. B. Textorius, known to the trade as manager of the New York office of Fuller & Warren Co.

William F. Dugan, heating engineer of Los Angeles, Cal., has opened an office at 426 Brison block where he is prepared to make plans and specifications for steam and hot water heating and superintend the installations of such plants.

Mr. Dugan has had an experience of 20 years in these lines on the Pacific coast and for three years managed the steam and hot water department of Holbrook, Merrill & Stetson.

Joseph Dixon Crucible Co., Jersey City, N. J., issue a valuabe pamphlet in regard to pipe connections. Every fitter will find it useful.

Gurney Heater Mfg. Co., Boston, use a scare-crow for the attractive feature of their latest mailing card. Investigation shows that there is no cause for alarm and that Gurney heaters are all right.

The Sunray Steam Boilers

AND WATER HEATERS

are made in over **ONE HUNDRED SIZES,** from 150 to 9,000 feet steam, and from 150 to 15,000 feet water. Factories at New York and Pittsburg. .·. .·.

GET OUR LATEST PRICES

THE J. L. MOTT IRON WORKS

84-90 BEEKMAN STREET **NEW YORK, N. Y.**

Invitation to the Saint Louis World's Fair is a recent circular of the American Radiator Co. The typographical arrangement may make the ordinary citizen think it was not intended for him, not being a saint. On looking inside, it will be seen that the American Radiator Co.'s goods have borne and will bear a considerable part in this big exposition. They heated buildings last winter, enabling the workers to finish their jobs and they have also developed a wonderful array of flowers and plants. In addition to half a dozen working jobs, this company have fitted up a "model house" exhibit in the Manufacturers' Building, block No. 6B, which they invite everybody to visit.

Prizer-Painter Stove & Heater Co., Reading, Pa., send us copy of their heater catalogue No. 5, devoted to Henderson heaters for water and steam.

This book is rather more expensive and complete than anything previously issued by these manufacturers.

The illustrations show very fully the outward appearance and the inside construction of the entire line of Thermo vertical sectional heaters for water and steam and the Orbis round heater, also for both water and steam. The showing seems to be a good one and those of the trade who have not this catalogue would do well to obtain it.

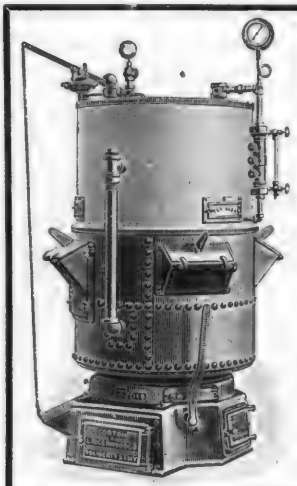
The Boiler Magazine, which made such a strong impression on its first appearance a few months ago, now comes out in a second edition. It is an uncommonly clever thing prepared by M. R. Ebersole, of Kellogg-Mackay-Cameron Co., Chicago. Copies can dubtless be had on application.

The Boilerologist is the latest publication of the Walker & Pratt Mfg. Co., Boston. It is interesting and all the trade should have it.

"A 32-Year Record" is the subject of some honest pride on the part of the Albany Steam Trap Co., who have just had a report from one of their customers who has used the "Blessing Traps" for 32 years for returning the condensations of steam coils to the boiler by gravity under full pressure.

"Heating With Ventilation" is a new booklet of the Boynton Furnace Co., New York. It relates especially to schools and similar buildings and is prepared by James A. Harding, who has charge of the school department of the Boynton Furnace Co.'s work. A valuable feature of this book is that it shows several model jobs of school heating and ventilating.

Copies will be sent on application to the manufacturers at New York or at their Boston office, 10 Post Office Square.



GORTON
SIDE-FEED
BOILERS
FOR STEAM AND HOT WATER HEATING

Send for New Catalog and Price List

Gorton & Lidgerwood Co.
96 Liberty St., New York

Old Colony Bldg., Chicago
77 Oliver St., Boston, Mass.

HEATING and VENTILATING BUILDINGS

Prof. R. C. Carpenter's standard work; latest edition; 577 pages, 277 cuts. **Price $4.00.**

HEATING AND VENTILATING MAGAZINE
1123 Broadway, New York

"When you see this sign, it is buying time." This is the legend on a large hanger sent by the J. H. McLain Co., Canton, O., to their trade. It will doubtless have the desired effect of attracting attention to Canton boilers.

Hohmann & Maurer Mfg. Co., Rochester, N. Y., are sending out their No. 2 catalogue of thermometers and other instruments used in heating and ventilating. They have taken this action on account of the great advance in methods of heating and ventilating large buildings, and the consequent production of various instruments adapted to this special line.

Copies of the catalogue will be sent on application.

Furman boilers are the subject of a 52-page catalogue issued by Herendeen Mfg. Co., Geneva, N. Y. In the prefatory remarks stress is laid upon the fact that the Furman boilers are sold exclusively to the trade; the long established standing of the Furman boilers is also dwelt upon as this is one of the oldest companies in the heater manufacturing business.

There are large and handsomely executed illustrations of various Furman products—the new sectional, portable water tube, Furman brick set and Furman junior boilers.

Copies will be sent on application.

"Humidity and Textile Manufactures" is the subject of an interesting little story told by the Regenerated Cold Air Co., 147 Milk street, Boston.

It is most strikingly gotten up in linen covers. It makes a strong argument in favor of mechanical humidifiers, being devoted specially to mill conditions.

Powers Regulator Co., Chicago, have issued an interesting and usful catalogue of automatic temperature controlling apparatus. Copies will be sent on application.

Reasons a-plenty for use of Thatcher Heaters are given in a little yellow circular, folded in quaint form and sent out by the Thatcher Furnace Co., 240 Water street, New York.

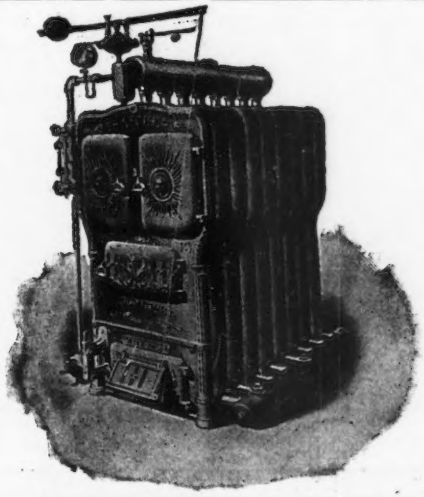
What is more important, the reasons given are pretty good ones and help to explain the popularity of the well known Thatcher heaters.

Walworth Mfg. Co., Boston, revised on June first the list of Stillson wrench parts.

The Walworth Company are just now making a special push on their Walmanco flanged-over pipe joints for heavy pressure work.

Ideal Junior Tank Heater is the latest product of the American Radiator Co., Chicago. All of the Ideal boilers are all right and this may be expected to prove no disgrace to the family.

THATCHER STEAM AND HOT WATER HEATERS



DESIGNED first of all to save fuel—by utilizing all the heat units in the coal. . .

BUILT in a large modern plant where the most improved machinery and careful management make possible Thatcher quality at competitive prices. . . . .

THATCHER FURNACE CO., 240 Water Street, NEW YORK

We have an up-to-date cooperative business getting plan. It does as much for our dealers as it does for us. Drop us a line and our salesman will call and tell you all about it.

B & J-1

Buffalo Forge Co. are the great annexationists. Not long ago they acquired the large machinery business of Geo. L. Squier & Co., and now have taken on the Buffalo Steam Pump Co.

Pratt Chuck Co., Frankfort, N. Y., have made a record in getting themselves and their goods known to everybody in the trade within a comparatively few months. Everybody likes the goods, everybody likes the men and the men advertise the goods most effectively.

The Aeolipyle is a comparatively unassuming little device which has been brought to a most satisfactory point of success by the pushing qualities of the energetic manager, A. W. Main.

Kellogg-Richmond Co., New York and Norwich, have planned a most aggresive campaign. President Kellogg, Treasurer McGee and Manager Gates are all installed now in the Transit Building and an adequate force of salesmen are covering the country.

John H. Pierce, president, and Charles I. Pierce, secretary, of the Western Tube Co., Kewanee, Ill., have resigned their positions with that company. Mr. John H. Pierce is one of the men being strongly pushed for the republican nomination for Governor of Illinois.

International Heater Co., Utica, N. Y., will build a warehouse in Chicago, 50x80 feet, four stories high.

Syracuse Stove Works, Syracuse, N. Y., are meeting with gratifying success in the introduction of their new line of registers which are artistically designed, handsomely finished and give adequate air opening.

Kieley & Mueller will shortly move into their new building at 34 West 13th street, New York. The business, started in the basement of the Butterick Building, now has a very substantial building of its own and we may expect Kieley specialties to be boomed harder than ever. They could not be made better.

Hart & Crouse Co., Utica, N. Y., are constructing, in addition to their present large line of boilers, an entirely new line of steam and hot water heaters which it is expected will be ready for the market this season. This new line embodies some special new patented features that will be interesting to the trade.

Lunkenheimer Co., Cincinnati, invite everyone to visit their exhibit in Machinery Hall at the St. Louis exhibition.

Prof. J. H. Kinealy has opened an engineering office at 619 Granite Bldg., St. Louis. Everybody will wish success to this genial gentleman and able expert.

Utica Heater Co., Utica, N. Y., like almost all of the other foundrymen in Utica, have been enjoying a seige and their offices are turned into barracks for the besieged molders. They keep right on turning out Imperial boilers and furnaces.

Blake & Andros, 30 Portland street, Boston, Mass., are selling more of their B. & A. Union Elbow Valves for hot water radiators than ever before, in spite of the fact that the present season is not the best ever heard of. It simply means that the goods are popular and that the manufacturers have been doing some effective hustling.

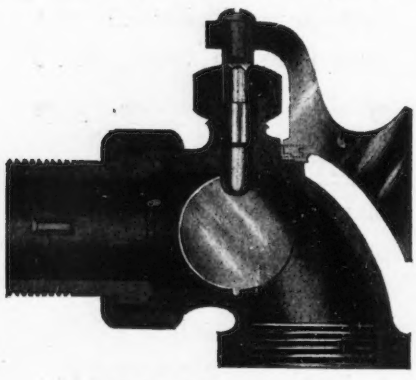
New York Radiator Co., Utica, N. Y., have completed their entire line of two, three and four column radiators in all heights, both plain and ornamental for steam and hot water. A little later they will add a single column. They are now at work on an indirect radiator.

"B. & A."

COMBINATION

Union Elbow Valve

For Hot Water (Pat. Jan 30, 1900).



OPERATED BY THE FOOT.
DOES NOT STICK BY CORROSION.

Elegant in Design, Quick Opening (quarter turn), Curved Waterway.
Packed ready to use,
Nickel-plated and Finished Trimmings,
Every One Warranted.

BLAKE & ANDROS,
30 Portland Street, - BOSTON.

A. MUGFORD
Engraver AND Electrotyper
ILLUSTRATIONS OF HEATING SYSTEMS A SPECIALTY.
NEW YORK · HARTFORD · BOSTON

Harry H. Hellerman, manager of the Penn Engineering Co., Philadelphia, was married May 4 to Miss Emily Weaver Lutz.

John Adams Rathbone, superintendent of the United States Heater Co., and Miss Florence Tiffany Cole, both of Detroit, will be married May 16.

WANTED

Experienced salesman of boilers and heating goods wants position. Is specially familiar with New England trade. Address S. F. A., c|o Heating and Ventilating Magazine.

American Heating, Ventilating and Drying goods wanted; apparatus for brick or lumber kilns, boilers, dryers and mechanical draft. Will handle on royalty or buy English patents. SUTCLIFFE, Cathedral Corner, Fennel street, Manchester, England.

Wanted: Position by man thoroughly competent in all branches of steam and hot water heating, mechanical ventilation, high pressure and power work, also vacuum system with good executive ability and knowledge of buying and estimating. Address B. H. S., c|o Heating and Ventilating Magazine.

ELMO AIR VALVES

AUTOMATIC FLOAT — **LOCK SHIELD AUTOMATIC FLOAT**

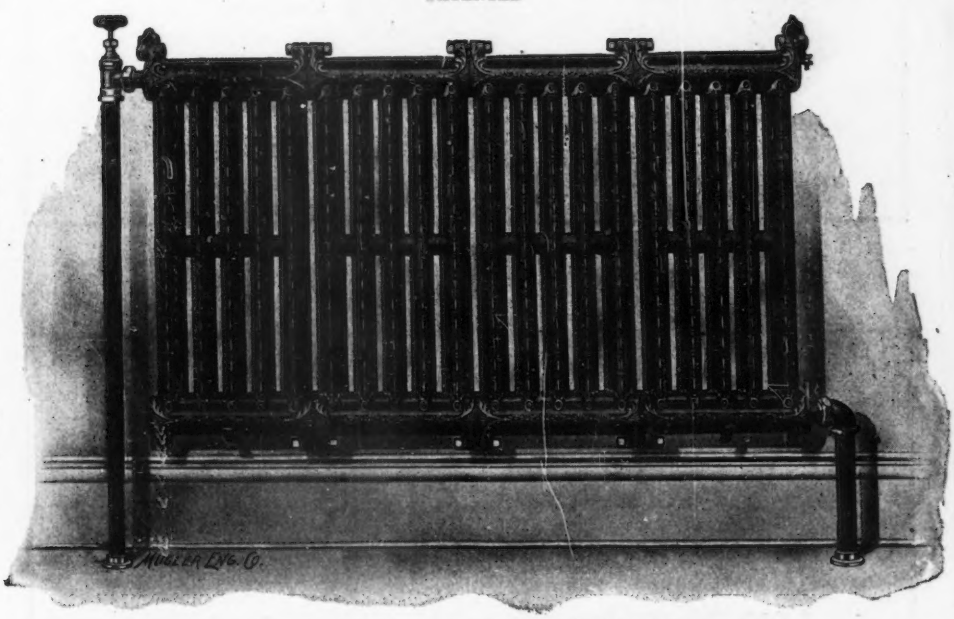
First class, high grade goods. Close by flotation and expansion. Many special features of excellence which will be readily appreciated : : :

PHELPS BROTHERS

210 Water Street New York

"Novus" Wall Radiator

PATENTED



Slip Nipple Connections Consequent freedom from leaks when many sections are combined in one radiator. Easily assembled without special tools. **Artistic in Appearance**

National Radiator Company, Johnstown, Penn.

ZINC-COATED STEEL SLIP NIPPLES

FOR STEAM AND HOT WATER RADIATORS AND HOUSE HEATING BOILERS

These Nipples are Rust-proof; Impervious to the Action of Distilled Water; not affected by Electrolytic Action; are Absolutely True to Size; are Elastic and Adapt Themselves to any Inaccuracies in Boring of Castings.

Made in All Required Sizes.

Correspondence Solicited.

THE PRATT CHUCK CO.

FRANKFORT, N. Y.

Free Samples furnished to interested parties.